

CLAIMS:

1. (Amended) A condenser sensor, comprising: an electrically conductive case having an opening portion formed therein and an opposing portion opposing to and spaced apart from said opening portion; a fixed electrode received in said electrically conductive case through said opening portion; an electrically conductive diaphragm accommodated in said electrically conductive case, said electrically conductive diaphragm spaced apart from said fixed electrode and opposing to said opening portion; an electrically conductive diaphragm supporting member disposed in said electrically conductive case to support said diaphragm; a circuit packaging board disposed in said electrically conductive case to be held in electrical contact with said fixed electrode and said diaphragm respectively through said electrically conductive case and said diaphragm supporting member; and a deformation protecting member for protecting said opposing portion from being deformed, in which said deformation protecting member intervenes between said electrically conductive case and said diaphragm, said deformation protecting member is disposed inwardly of a circumference of an oscillatable portion of said diaphragm, said electrically conductive case and said fixed electrode are respectively formed with acoustic apertures, a total area of said acoustic aperture formed in said electrically conductive case is larger than a total area of said acoustic aperture formed in said fixed electrode, and said total area of said acoustic aperture formed in said fixed electrode is larger than one thousandth of a total area of said oscillatable portion of said diaphragm but smaller than one tenth of said total area of said oscillatable portion of said diaphragm,
2. (Amended) A condenser sensor, comprising: an electrically conductive case having an opening portion formed therein and an opposing portion opposing to and spaced apart from said opening portion; a fixed electrode received in said electrically conductive case through said opening portion; an electrically conductive diaphragm accommodated in said electrically conductive case, said electrically conductive diaphragm spaced apart from said fixed electrode and opposing to said opening portion; an electrically conductive diaphragm supporting member disposed in said electrically conductive case to support said diaphragm; a circuit packaging board disposed in said electrically conductive case to be held in electrical contact with said fixed electrode and said diaphragm respectively through said electrically conductive case and said diaphragm supporting member; and a deformation protecting member for protecting said opposing portion from being deformed, in which said deformation protecting

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member intervenes between said electrically conductive case and said diaphragm, said deformation protecting member is disposed inwardly of a circumference of an oscillatable portion of said diaphragm, and which further comprises an electrically conductive cloth attached to and electrically connected with said electrically conductive case, and in which said electrically conductive case and said fixed electrode are respectively formed with acoustic apertures, and said acoustic aperture of said electrically conductive case is covered by said electrically conductive cloth.

3. (Amended) A condenser sensor as set forth in claim 1 or claim 2, in which said diaphragm is made of a resin film having a multiple-layer electrically conductive material, said multiple-layer electrically conductive material being selected from among Au, Ni, Pt, Ti, V, W, Ta, and/or any combination thereof, superimposed on said resin film by a sputtering method.

4. (Amended) A condenser sensor as set forth in claim 1, in which said diaphragm supporting member is made of a composite body including an electrically conductive material and an electrically insulating material, a circumferential portion of said diaphragm is as a whole supported by said electrically conductive material of said diaphragm supporting member and by said electrically insulating material of said diaphragm supporting member, and said diaphragm is bonded to said diaphragm supporting member with an epoxy adhesive.

5. (Amended) A condenser sensor as set forth in any one of claims 1 through 4, in which said diaphragm is made of a multiple-layer material including a resin film and an electrically conductive material superimposed on said resin film, and a thickness of said diaphragm is greater than 1 μ m but less than 2 μ m.

6. (Amended) A condenser sensor as set forth in any one of claims 1 through 5, in which a base resonance frequency of said diaphragm is greater than 10 KHz but less than 35 KHz.

7. (Amended) A condenser sensor as set forth in claim 1 or claim 2, further comprising: an electret member attached to said fixed electrode, and in which a thickness of said electret member deposited or thermally fusion-spliced on said fixed electrode is greater than 3 μ m but less than 25 μ m.

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8. (Amended) A condenser sensor as set forth in claim 2, in which said electrically conductive cloth is made of a composite body including an electrically conductive material and an electrically insulating material.

5 9. (Amended) A condenser sensor as set forth in claim 1 or claim 2, further comprising: an electrically conductive spacer intervening between said electrically conductive case and said fixed electrode, and in which said spacer is less in thickness than said electrically conductive case, and said electrically conductive case and said fixed electrode are respectively formed with acoustic apertures.

10 10. (Amended) A condenser sensor as set forth in claim 9, in which said fixed electrode has an aperture portion having said acoustic aperture formed therein and a remaining portion other than said aperture portion, and said acoustic aperture formed in said electrically conductive case is at least partly opposing to said remaining portion of
15 said fixed electrode.

11. (Amended) A condenser sensor as set forth in claim 1 or claim 2, in which said circumferential portion of said fixed electrode is different in shape from that of said diaphragm.

20 12. (Amended) A condenser sensor as set forth in claim 1 or claim 2, in which said electrically conductive case has a surface opposing to said diaphragm supporting member, and which further comprises an electrically insulating member attached to said surface of said electrically conductive case by fusion-splice, deposition, or adhesive
25 bond.

13. (Amended) A condenser sensor as set forth in claim 1 or claim 2, in which said diaphragm supporting member is held in electrical and physical contact with said circuit packaging board, and which further comprises an electrically insulating member
30 intervening between said electrically conductive case and said diaphragm supporting member, and in which said electrically insulating member is inserted into said electrically conductive case at least before or after said fixed electrode is inserted into said electrically conductive case.

35 14. (Amended) A condenser sensor as set forth in claim 13, in which said electrically insulating member is made of a composite body including a metal base

material and an electrically insulating material coated on a surface of said metal base material.

15. (Amended) A condenser sensor as set forth in claim 1, claim 2 or claim 13,
5 further comprising: an electrically conductive member intervening between said electrically conductive diaphragm supporting member and said circuit packaging board, and in which said circuit packaging board is electrically connected with said electrically conductive diaphragm supporting member through said electrically conductive member.

10 16. (Amended) A condenser sensor as set forth in claim 1 or claim 2, further comprising: a terminal electrically connectable to an exterior appliance; and a noise filtering member electrically connected to said terminal to filter out a noise, and in which said noise filtering member is mounted on said circuit packaging board, and includes an capacitor element and resistance element.

15 17. (Amended) A condenser sensor as set forth in claim 16, further comprising a varistor chip part electrically connected to said terminal, and mounted on said circuit packaging board.

20 18. (Amended) A condenser sensor as set forth in claim 1 or claim 2, further comprising:
an element embedded in said circuit packaging board.

25 19. (Amended) A condenser sensor as set forth in claim 1 or claim 2, further comprising: a thin film resistor element or a thin film capacitor element formed on said circuit packaging board by way of at least one of a printing process and a thin film processing.

30 20. (Amended) A condenser sensor as set forth in claim 1 or claim 2, further comprising: a plurality of bare chips mounted on said circuit packaging board through the steps of imparting pressing force to said bare chips to have said bare chips temporally bonded to said circuit packaging board with resin adhesive and then heat and pressing force are simultaneously imparted to the bare chips to have said bare chips completely bonded to said circuit packaging board.

35 21. (Amended) A condenser sensor as set forth in claim 1 or claim 2, in which said

electrically conductive case has a surface opposing to said fixed electrode, and which further comprises: an electrically insulating member attached to said surface of said electrically conductive case; and an electrically conductive member electrically connecting said electrically conductive case with said fixed electrode.

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22. (Cancelled)

23. (Cancelled)

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24. (Cancelled)

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